Create Data Frame with Relative Weight and Gabelhouse Length Categories

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Here I need to make two data files. Both need to contain fish caught in the years 2013-2016. Both will contain the Relative Weight (Wr) of each fish and the gabel house length category each fish fits into. Then I will create two CLEAN data files one of wich will contain only fish larger than stock length and another with all fish of any length.

The data file with fish of all lengths will be used to compare the length frequency distribution between years. The data frame with only fish stock length and larger will be used to compare the proportional size densities between years and with the relative weight between years.

```
Cond <- read.csv("Data/Raw-Data/Nearshore-Biodat_2013-2017.csv") %>%
  filterD(Species == 317) %>%
  filterD(!is.na(Length)) %>%
  filterD(!is.na(Weight)) %>%
  dplyr::select(Year:Length,Age:Sex)

Cond %<>% mutate(lcat20=lencat(Length,w=20)) %>%
  mutate(logW=log10(Weight),logL=log10(Length))

Cond$fyr <- factor(Cond$Year)

Cond$fyr <- str_sub(Cond$fyr,start = 3,end = 4)
Cond %<>%  dplyr::select(fyr,Year:Length,Age:logL)

#str(Cond)
headtail(Cond)
```

```
##     fyr Year Site FID Weight Length Age SexCon Sex lcat20     logW
## 1    13 2013    2  77     54    154   1      1   1    140 1.732394
## 2    13 2013    2  78     57    159   1      6   2    140 1.755875
## 3    13 2013    2  71     72    164   2      8   2    160 1.857332
## 508  17 2017   18  NA    950    385  NA     NA  NA    380 2.977724
## 509  17 2017   18  NA    900    402  NA     NA  NA    400 2.954243
## 510  17 2017   18  NA   1400    438  NA     NA  NA    420 3.146128
##         logL
## 1   2.187521
## 2   2.201397
## 3   2.214844
## 508 2.585461
## 509 2.604226
## 510 2.641474
```

```
unique(Cond$Year)
```

```
## [1] 2013 2014 2015 2016 2017
```

Note *I found an outlier when going through '2014-2016_condition_largemouth-bass.Rmd' which I will now remove.*

```
nrow(Cond)
(Where.r.u <- Cond[Cond$Weight==1714,]) ## row 78
(rm.outlier <- as.numeric(row.names(Cond[Cond$Weight==1714,])))


Cond <- Cond[-c(rm.outlier),] %>%
  filter(!is.na(Year))
str(Cond)
headtail(Cond)
```

Year	Number of Fish	Number of Sites	Unique
2013	113	8	~1 site (NA)
2014	143	11	2 unique (1 & 16)
2015	80	9	1 Unique (5)
2016	131	10	1 Unique (14)
2017	42	8	2 unique (3 & 9)
Total	511		6 maybe 7 Unique Sites

12 nearshore sites were sampled annually 2013 - 2017, 10 sites are sampled every year in addition to 2 sites which are sampled every five years. Length and weight data used in our analysis were obtained from 114 largemouth bass caught during 2013, 143 during 2014, 80 during 2015, and 132 during 2016. During 2013 - 2016 a total of 469 largemouth bass were obtained from 18 sites.

Calculate Standard and Relative Weights

```
(wsLMB <- wsVal("Largemouth Bass", simplify = TRUE))
(wsLMB_min <- wsLMB[["min.TL"]])
(wsLMB_int <- wsLMB[["int"]])
(wsLMB_slp <- wsLMB[["slope"]])
```

```
Cond %<>% mutate(Ws = 10^(wsLMB_int+wsLMB_slp*logL),
                 Wr=(Weight/Ws)*100)
headtail(Cond)
```

```
##     fyr Year Site FID Weight Length Age SexCon Sex lcat20     logW
## 1    13 2013    2  77     54    154   1      1   1    140 1.732394
## 2    13 2013    2  78     57    159   1      6   2    140 1.755875
## 3    13 2013    2  71     72    164   2      8   2    160 1.857332
## 507  17 2017   18  NA    950    385  NA     NA  NA    380 2.977724
## 508  17 2017   18  NA    900    402  NA     NA  NA    400 2.954243
## 509  17 2017   18  NA   1400    438  NA     NA  NA    420 3.146128
##         logL         Ws        Wr
## 1   2.187521   42.83071 126.07775
## 2   2.201397   47.55244 119.86767
## 3   2.214844   52.62401 136.81968
## 507 2.585461  859.43486 110.53775
## 508 2.604226  989.99243  90.90979
## 509 2.641474 1310.82515 106.80296
```

Creating data file with all size fish

```
### creating size breaks for Gabelhouse Length categories for Largemouth Bass
(lmb.cuts2 <- psdVal("Largemouth Bass"))
```

```
##  substock     stock   quality preferred memorable    trophy
##         0       200       300       380       510       630
```

```
### adding gcat variable to data frame
lmb <- Cond %>%
  mutate(gcat=lencat(Length, breaks = lmb.cuts2,
                     use.names = TRUE, drop.levels = TRUE))  ### create Gabelhouse Length Categories
lmb %<>% dplyr::select(fyr:Weight, Ws, Wr, Length, lcat20, gcat, Age:Sex)
  #dplyr::select(fyr:Sex,Ws,Wr,lcat20,gcat)

headtail(lmb, n=2)
```

```
##     fyr Year Site FID Weight         Ws        Wr Length lcat20      gcat
## 1    13 2013    2  77     54   42.83071 126.07775    154    140  substock
## 2    13 2013    2  78     57   47.55244 119.86767    159    140  substock
## 508  17 2017   18  NA    900  989.99243  90.90979    402    400 preferred
## 509  17 2017   18  NA   1400 1310.82515 106.80296    438    420 preferred
##     Age SexCon Sex
## 1     1      1   1
## 2     1      6   2
## 508  NA     NA  NA
## 509  NA     NA  NA
```

```
#2-9-2018#write.csv(lmb,file="Data/Clean-Data/largemouth-bass_Wr_NS.csv", row.names = FALSE)
```

Creating Data File with Only Stock and Larger Fish

```
### adding gcat variable to data frame
Stock <- Cond %>%
  filter(Length>=lmb.cuts2["stock"]) %>%
  mutate(gcat=lencat(Length, breaks = lmb.cuts2,
                     use.names = TRUE, drop.levels = TRUE))   ### create Gabelhouse Length Categories

Stock %<>% dplyr::select(fyr:Weight, Ws, Wr, Length, lcat20, gcat, Age:Sex)

headtail(Stock, n=2)
```

```
##     fyr Year Site FID Weight        Ws        Wr Length lcat20      gcat
## 1    13 2013    2  76    126  100.7561 125.05451    200    200     stock
## 2    13 2013    2  97    154  109.2372 140.97767    205    200     stock
## 444  17 2017   18  NA    900  989.9924  90.90979    402    400 preferred
## 445  17 2017   18  NA   1400 1310.8251 106.80296    438    420 preferred
##     Age SexCon Sex
## 1     2      8   2
## 2     2      1   1
## 444  NA     NA  NA
## 445  NA     NA  NA
```

```
#2-9-2018#write.csv(Stock,file="Data/Clean-Data/largemouth-bass_Wr_Stock.csv", row.names = FALSE)
```

Creating a Data File to Summarize Relative Weight by Year for Stock Length Individuals

```
Stock %<>% filterD(!is.na(Wr))

Summarize(Wr~fyr, data=Stock, digits = 0) ### Wr Weight by Year
```

```
##   fyr   n mean sd min  Q1 median  Q3 max
## 1  13  97  113 13  76 104    113 122 144
## 2  14 140  110 16  80  99    107 118 151
## 3  15  67  110 16  78  99    109 121 150
## 4  16 106  115 14  62 108    116 125 146
## 5  17  35  124 34  71 104    111 131 215
```

```
(Wr.fyr.gcat_Stock <- Summarize(Wr~fyr*gcat, data=Stock) %>%
    arrange(fyr,gcat))
```

```
##    fyr      gcat  n      mean        sd    min     Q1 median    Q3   max
## 1   13 preferred 16 106.85136 11.405237  92.32  98.65 104.40 114.4 133.1
## 2   13   quality 40 108.20201 11.400456  76.14 103.60 107.70 116.6 131.3
## 3   13     stock 41 120.98826 12.034098  94.13 113.20 120.80 128.4 143.8
## 4   14 preferred 18  97.67045  8.942296  83.65  90.40  98.58 103.0 115.5
## 5   14   quality 57 103.51170 11.643284  80.40  96.07 102.20 111.6 133.1
## 6   14     stock 65 118.27433 15.782376  88.74 106.70 116.10 127.5 151.3
## 7   15 preferred 15  97.09075 12.451362  78.22  86.01  96.69 105.6 119.8
## 8   15   quality 38 109.31855 12.915921  84.02 100.80 108.10 120.5 131.0
## 9   15     stock 14 124.90379 12.564609 103.80 116.60 123.90 133.9 149.8
## 10  16 preferred 10 107.72186  7.170036  94.36 104.30 107.80 111.7 118.9
## 11  16   quality 44 111.22398 14.357351  61.76 105.50 110.50 118.9 146.2
## 12  16     stock 52 120.60206 12.540774  68.71 113.90 121.60 127.1 144.9
## 13  17 preferred  9 106.38263 12.144023  86.03 106.30 107.10 110.5 128.0
## 14  17   quality 15 109.39021 17.439429  70.94  98.39 107.20 126.8 132.5
## 15  17     stock 11 157.08177 38.820674 105.00 131.20 155.60 185.8 214.8
```

```
str(Wr.fyr.gcat_Stock)
```

```
## 'data.frame':    15 obs. of  10 variables:
##  $ fyr   : chr  "13" "13" "13" "14" ...
##  $ gcat  : Factor w/ 3 levels "preferred","quality",..: 1 2 3 1 2 3 1 2 3 1 ...
##  $ n     : num  16 40 41 18 57 65 15 38 14 10 ...
##  $ mean  : num  106.9 108.2 121 97.7 103.5 ...
##  $ sd    : num  11.41 11.4 12.03 8.94 11.64 ...
##  $ min   : num  92.3 76.1 94.1 83.7 80.4 ...
##  $ Q1    : num  98.7 103.6 113.2 90.4 96.1 ...
##  $ median: num  104.4 107.7 120.8 98.6 102.2 ...
##  $ Q3    : num  114 117 128 103 112 ...
##  $ max   : num  133 131 144 116 133 ...
```

```
#2-9-2018#write.csv(Wr.fyr.gcat_Stock,file = "Data/Clean-Data/summary-data/relative-weight_largemouth-b
```

I have created a file with the relative weight of each gabelhouse length category for each year. The file name is relative-weight_largemouth-bass_STOCK_Summary.csv.

Note

The relative weight data contains only stock length individuals. This is so that I can easily compare the relative weight of fish with PSD. This is done despite the min TL being 150 mm. I may want to summarize relative weight for 150mm and greater length individuals in the future to see if young/small fish drive down or increase Wr.

Creating a Data File to Summarize Relative Weight by Year Length >= 150mm

```
lmb.Wr <- lmb %>%
  filter(Length >= wsLMB_min) %>%
  filterD(Year>=2014)

(lmb.Wr.gcat <- Summarize(Wr~fyr*gcat,data = lmb.Wr,digits = 0) %>%
    arrange(fyr,gcat))
```

```
##    fyr      gcat  n mean  sd min  Q1 median  Q3 max
## 1   14 preferred 18   98   9  84  90     99 103 116
## 2   14   quality 57  104  12  80  96    102 112 133
## 3   14     stock 65  118  16  89 107    116 128 151
## 4   14  substock  3  141  18 128 131    133 147 162
## 5   15 preferred 15   97  12  78  86     97 106 120
## 6   15   quality 38  109  13  84 101    108 120 131
## 7   15     stock 14  125  13 104 117    124 134 150
## 8   15  substock  6  161  49 113 126    149 181 243
## 9   16 preferred 10  108   7  94 104    108 112 119
## 10  16   quality 44  111  14  62 106    110 119 146
## 11  16     stock 52  121  13  69 114    122 127 145
## 12  16  substock 16  128   7 117 123    127 133 145
## 13  17 preferred  9  106  12  86 106    107 110 128
## 14  17   quality 15  109  17  71  98    107 127 132
## 15  17     stock 11  157  39 105 131    156 186 215
## 16  17  substock  3  153 105  83  93    103 189 274
```

```
#2-9-2018#write.csv(lmb.Wr.gcat,file = "Data/Clean-Data/summary-data/relative-weight_largemouth-bass_15
```